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IMAGING AND DIAGNOSTIC TESTING

MEN ARE MORE SUSCEPTIBLE THAN WOMEN TO THE EFFECTS OF OBESITY ON CARDIAC GLUCOSE METABOLISM

ACC Poster Contributions
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Background: Obesity contributes to myocardial dysfunction by increasing myocardial fatty acid metabolism in a gender-specific manner, likely at the expense of glucose, a more oxygen-efficient fuel. However, effects of obesity on intramyocardial metabolism of glucose have not been defined. The purpose of this study was to determine the effect of obesity and gender on myocardial glycolysis and glucose oxidation in humans.

Methods: 42 healthy obese and non obese subjects underwent positron emission tomography, echocardiography, plasma substrate and hormone sampling after fasting.

Results: Obese men had lower myocardial glucose metabolism than nonobese men (Table). Higher body mass index (BMI), body fat %, and systemic insulin resistance in men related to lower myocardial glucose metabolism. In contrast, myocardial glycolysis and glucose oxidation did not differ in obese and nonobese women and did not relate to BMI, body fat %, or insulin resistance. Importantly, lower myocardial glycolysis and glucose oxidation related to higher left ventricular diastolic pressures estimated by E/Em.

		Non Obese vs Obese	Univariate Regression		
		Mean ± SEM	HOMA	Fat%	BMI
Men	Myocardial Glucose Utilization (nmol/g/min)	309 ± 53 vs. 125 ± 38 **p < 0.05**	r = 0.70 **p = 0.003**	r = 0.66 **p = 0.02**	r = 0.67 **p = 0.005**
	Myocardial Glycolysis (nmol/g/min)	127 ± 32 vs. 35 ± 11 **p < 0.05**	r = 0.60 **p = 0.02**	r = 0.76 **p = 0.004**	r = 0.68 **p = 0.004**
	Myocardial Glycogen Synthesis (nmol/g/min)	180 ± 28 vs 93 ± 28 p = 0.1	r = 0.69 **p = 0.004**	r = 0.62 **p = 0.03**	r = 0.56 **p = 0.02**
	Myocardial Glucose Oxidation (nmol/g/min)	108 ± 29 vs 29 ± 9 **p < 0.05**	r = 0.59 **p = 0.02**	r = 0.76 **p = 0.004**	r = 0.66 **p = 0.005**
Women	Myocardial Glucose Utilization (nmol/g/min)	164 ± 36 vs 214 ± 49 p = ns	r = 0.33 p = ns	r = 0.07 p = ns	r = 0.02 p = ns
	Myocardial Glycolysis (nmol/g/min)	58 ± 18 vs 71 ± 20 p = ns	r = 0.31 p = ns	r = 0.0009 p = ns	r = 0.09 p = ns
	Myocardial Glycogen Synthesis (nmol/g/min)	103 ± 19 vs 124 ± 22 p = ns	r = 0.34 p = 0.09	r = 0.07 p = ns	p = 0.02 p = ns
	Myocardial Glucose Oxidation (nmol/g/min)	47 ± 14 vs 58 ± 16 p = ns	r = 0.32 p = ns	r = 0.02 p = ns	r = 0.08 p = ns
Left Ventricular Diastolic Pressure Estimation by Echocardiography					
	Myocardial Glycolysis vs E/Em		r = 0.38 **p = 0.03**		
	Myocardial Glucose Oxidation vs E/Em		r = 0.38 **p = 0.03**		

Conclusions: Obesity and insulin resistance are associated with lower myocardial glycolysis and glucose oxidation in men, but not women, which is related to higher filling pressures. Obesity may affect the heart's response to ischemic or hemodynamic challenge (which require glucose) in a gender-specific manner due to effects on myocardial glucose metabolism.